HIFAN 1591a

Improved neutralized compression and focusing of an intense ion beam using a final focus solenoid

by
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November 2007

This work was supported by the Director, Office of Science, Office of Fusion Energy Sciences, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

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Abstract. Future target heating experiments with space-charge dominated ion beams require simultaneous longitudinal bunching and transverse focusing. An experiment to simultaneously focus a singly charged potassium ion beam has been commissioned at LBNL. The space charge of the beam must be neutralized so only emittance limits the simultaneous focusing. An induction bunching module provides a head-to-tail velocity ramp upstream of a beam neutralizing plasma column and a final focus solenoid. The beam is tuned with a four-solenoid lattice to transport the neutralized compressing beam into a final focus solenoid which transversely focuses the beam at the target plane. We have improved the axial focus (>100 axial compression, < 2 ns pulses) and made recent improvements to reduce the beam spot size. A comparison of experimental and calculated results are presented, including simultaneous measurements of the transverse distribution and the axially compressed beam.

(This work was supported by the U.S. D.O.E. under DE-AC02-05H11231 and DE-AC02-76CH3073 for HIFS-VNL)